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EXAMINER	
SHAH, TANMAY K	

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2611	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/536,641	D'ALESSANDRO, PIERLUIGI	
	Examiner	Art Unit	
	TANMAY K. SHAH	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _3/10/09_.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-20_ is/are pending in the application.

4a) Of the above claim(s) _9_ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-20_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 4/20/09 has been entered.

Response to Arguments

2. Applicant's arguments with respect to claims 1 - 20 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 2 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 2, applicant refers to first value as being a ratio between cross correlation of said I and Q components of said I and Q components of the incoming I/Q modulated signal and a mean value of said I and Q components. Applicant also describes second and third value. However, in first claim the applicant describes the first value as being cross correlation of an I component and Q component of modulated signal. The first value or the second or the third

value can not be both. Applicant contradicts himself with first and second and third values of in claim 1 and claim 2. For, the purpose of examination claim 1 is examined however second claim needs clarification.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 4 – 8, 10 – 13, 15 - 20 are rejected under 35 U.S.C. 102(b) as being anticipated by **Wiss (US 20020097812).**

Regarding claim 1, a receiver for estimation and compensation of phase imbalance or gain imbalance, the receiver utilizing a QPSK modulation and a modulation scheme based on a complex scrambling code, the receiver comprising:

means for estimating the phase imbalance or gain imbalance (**i.e. as shown in Fig. 5 and described in page 4, paragraph 58 it reblances the I and Q component and estimates error or error functions which determines the imbalance or estimates imbalance.**) prior to symbol synchronization (**It is inherent to one of the ordinary skilled in the art to perform synchronization of the rebalanced I and Q component, the synchronization can not be**

performed if I and Q are imbalanced or offset) using **at least one of** a first value related to a cross correlation of an I component and a Q component of an incoming I/Q modulated signal (**i.e. in the presence of a phase imbalance, ε_{Φ} is an average cross correlation of the I and Q channels after the rebalancer, page 4, paragraph 54, again applicant reminded that the claim limitation says one of those three values**), a second value related to a cross correlation of a compensated I component and a compensated Q component of the modulated signal, and a third value related to a square of the compensated I component and a square of the compensated Q component of the modulated signal; and

means for compensating the I and Q components of the incoming I/Q modulated signal to provide compensated I and Q components (**i.e. as shown in Fig. 5 and described in page 4, paragraph 58 it reblances the I and Q component and estimates error or error functions which determines the imbalance or estimates imbalance. Page 1, paragraph 16 describes the signal is modulated**) for symbol synchronization (**It is inherent to one of the ordinary skilled in the art to perform synchronization of the rebalanced I and Q component, the synchronization can not be performed if I and Q are offset, it is inherent and well know in the art to synchronized rebalanced or compensated I and Q**).

Regarding claim 4, The receiver according to claim 1, where the means for compensating the I and Q components of the incoming I/Q modulated signal includes means for compensating the phase imbalance or gain imbalance before synchronization (**as described in claim 1, again i.e. as shown in Fig. 5 and described in page 4, paragraph 58 it reblances the I and Q component and estimates error or error functions which determines the imbalance or estimates imbalance. It is inherent to one of the ordinary skilled in the art to perform synchronization of the rebalanced I and Q component, the synchronization can not be performed if I and Q are offset, it is inherent and well know in the art to synchronized rebalanced or compensated I and Q**) based on **<u>at least one first ratio</u>** selected from the group consisting of a second ratio, a third ratio and a fourth ratio, wherein the second ratio is a ratio between a cross correlation of said I and Q components of the incoming I/Q modulated signal and a mean value of a square of the I component, wherein the third ratio is a ratio between the cross correlation of the I and Q components and a square root of a product between a mean value of the square of the I component and a mean value of a square of the Q component (**i.e. please refer to equation below page 4, paragraph 53, it is a square root of product of mean value of the square of I and square of Q, also it is being showed below**

$$g = \frac{\sqrt{\langle I_{MB}^2 \rangle}}{\sqrt{\langle Q_{MB}^2 \rangle}}$$

), and wherein the fourth ratio is a

ratio between the mean value of the square of the Q component and the mean value of the square of the component.

Regarding claim 5, the receiver according to claim 1, wherein the receiver comprises a WCDMA (UMTS) receiver and wherein a feed-forward scheme or a feed- back scheme is established in the receiver **(i.e. shown in Fig. 5 it feedbacks the 14 and 16 to 36 and 26 again, so it is a feed-back scheme, does not specifically disclose it is a WCDMA receiver, but since it receives multi carrier signal it can be implemented in WCDMA (MUTS) receiver)**.

Regarding claim 6, The receiver according to claim 1, wherein the estimation of the phase imbalance or gain imbalance is carried out iteratively **(page 4, paragraph 54, Determining a iteratively will generate an error that is equal to the gain imbalance. In the presence of a phase imbalance, .epsilon..sub..PHI. is an average cross correlation of the I and Q channels after the rebalancer)**.

Regarding claim 7, A method for estimation and compensation of phase imbalance or gain imbalance in a receiver utilizing a QPSK modulation and a modulation scheme based on a complex scrambling code, the demodulation method comprising the step of:

estimating the phase imbalance or gain imbalance of an incoming I/Q modulated signal before symbol synchronization (**as described in claim 1, again i.e. as shown in Fig. 5 and described in page 4, paragraph 58 it reblances the I and Q component and estimates error or error functions which determines the imbalance or estimates imbalance. It is inherent to one of the ordinary skilled in the art to perform synchronization of the rebalanced I and Q component, the synchronization can not be performed if I and Q are offset, it is inherent and well know in the art to synchronized rebalanced or compensated I and Q**) using **at least one** of a first value related to a cross correlation of an I component and a Q component of the modulated signal, a second value related to a cross correlation of a compensated I component and a compensated Q component of the modulated signal, and a third value related to a square of the compensated I component and a square of the compensated Q component of the modulated signal (**i.e. in the presence of a phase imbalance, ε_{Φ} is an average cross correlation of the I and Q channels after the rebalancer, page 4, paragraph 54**); and

compensating the phase imbalance or gain imbalance on the basis of the at least one first ratio such that a feed-forward scheme or a feed-back scheme is established (**i.e. as shown in Fig. 5, the corrected output of 14 and 18 which is being fed back to the system again so it does the process repeatedly or iteratively, as described in page 4, paragraph 58, since it feed backs data, it is considered fee-back scheme**); and

wherein providing estimated and compensated I and Q components of the incoming I/Q modulated signal are provided for symbol synchronization (**i.e. as shown in Fig. 5 and described in page 4, paragraph 58 it reblances the I and Q component and estimates error or error functions which determines the imbalance or estimates imbalance. It is inherent to one of the ordinary skilled in the art to perform synchronization of the rebalanced I and Q component, the synchronization can not be performed if I and Q are offset, it is inherent and well know in the art to synchronized rebalanced or compensated I and Q**).

Regarding claim 8, there are substantially same limitations as claim 4, thus the same rejection is applicable.

Regarding claim 10, there are substantially same limitations as claim 6, thus the same rejection is applicable.

Regarding claim 11, there are substantially same limitations as claim 7, thus the same rejection is applicable.

Regarding claim 12, A method, comprising:

iteratively compensating a phase imbalance or gain imbalance in a receiver (**i.e. as shown in Fig. 5, the corrected output of 14 and 18 which is being fed back to the system again so it does the process repeatedly or iteratively, It reblances the phase and gain imbalance as described in page 4, paragraph 58, also page 3, paragraph 54 discloses the process is done iteratively**), the receiver utilizing a QPSK modulation and a modulation scheme based on a complex scrambling code, of the iteratively compensating including (**i.e. It is a further object of this invention to provide such compensation which requires no tone insertion, and is independent of the modulation employed by the system, page 1, paragraph 16, So regardless of any modulation scheme it will be able to perform the steps of method below**):

a) determining an error function (**i.e. the error function are considered output of 34 and output of 24 of Fig. 5, as described in the application the error function is just a multiplication of corrected I and Q function, paragraph 14 of specification**) on the basis of samples of phase compensated in- phase components and quadrature components of a revived I/Q modulated signal (**as shown in Fig. 5 the receiver receives the I (in-phase) and Q (Quadrature-phase) component, as shown in the figure it is being fed in to the A/D converter so it samples the I and Q component of the received signal, please refer to Fig. 5**);

b) filtering the error function (**i.e. the output of 34 and 24 is being fed into the normalized function 36 and 26, as described in page 4, paragraph**

59 They account for signal level fluctuations into the receiver. These functions have the effect of ensuring constant adaptation behavior regardless of input signal level. For a given system these blocks may be set to a constant less than unity, so it is a filtering function);

c) integrating the filtered error function (**i.e. as shown in Fig. 5, component 40 integrates the output of the normalize function 36 and 26, The output of 28 is then digitally integrated by a register 30, The output of 38 is then digitally integrated by a register 40, page 4, paragraph 58**);

d) determining a modified error function by adding the integrated (**i.e. as shown in Fig. 5, the normalized (36 and 26 of Fig. 5) and integrated (40 and 30 of Fig. 5)**) and filtered error function (**i.e. the output of the normalize function 36 and 26 of Fig. 5**) to a product of the integrated and filtered error function and a parameter based on speed and stability (**i.e. as shown in Fig. 5 the normalized (output of 36 and 26) is being multiplied with a parameter μ_{Φ} at 38 and then being added at step 42 with the integrated step 40 function, page 4, paragraph 58, as described the abstract an initial set of convergence parameters can be applied to speed-up the start of convergence, and a second set of smaller values can be applied some time later for more precise convergence**);

e) determining a corrected output signal of the I/Q components of the received signal on the basis of subsequent samples of phase compensated in-phase components and quadrature components of the received I/Q modulated signal

and the modified error function (**i.e. the output of the 14 and 18 is rebalanced as described in page 4, paragraph 58, again as described above the I and Q are being sampled by A/D 10 and 12 of Fig. 5 and it is subsequent as shown in page 2 and 3, paragraph 39, also the received signal is modulated and the modified error function is the output of 40 as described above in step d**);

f) returning to step a (**i.e. as shown in Fig. 5 the output is being fed back to the normalize function 36 and 26 again so it repeats step a again**); and

providing estimated and compensated I and Q components of the received I/Q modulated signal to a symbol synchronizer for synchronization (**i.e. as shown in Fig. 5 and described in page 4, paragraph 58 it reblances the I and Q component and estimates error. It is inherent to one of the ordinary skilled in the art to perform synchronization of the rebalanced I and Q component, the synchronization can not be performed if I and Q are offset**).

Regarding claim 13, A method, comprising:

iteratively compensating a phase imbalance or gain imbalance in a receiver (**i.e. as shown in Fig. 5, the corrected output of 14 and 18 which is being fed back to the system again so it does the process repeatedly or iteratively, It reblances the phase and gain imbalance as described in page 4, paragraph 58**), the receiver utilizing a QPSK modulation and a modulation

scheme based on a complex scrambling code, of the iteratively compensating including **(i.e. It is a further object of this invention to provide such compensation which requires no tone insertion, and is independent of the modulation employed by the system, and the adaptive performance of which is excellent even at low SNR, page 1, paragraph 16, So regardless of any modulation scheme it will be able to perform the steps of method below)**:

a) determining an error function **(i.e. the error function are considered output of 34 and output of 24 of Fig. 5, as described in the application the error function is just a multiplication of corrected I and Q function, paragraph 14 of specification)** on the basis of samples of phase compensated in- phase components and quadrature components of a revived I/Q modulated signal **(as shown in Fig. 5 the receiver receives the I (in-phase) and Q (Quadrature-phase) component, as shown in the figure it is being fed in to the A/D converter so it samples the I and Q component of the received signal, please refer to Fig. 5)**;

b) filtering the error function **(i.e. the output of 34 and 24 is being fed into the normalized function 36 and 26, as described in page 4, paragraph 59 They account for signal level fluctuations into the receiver. These functions have the effect of ensuring constant adaptation behavior regardless of input signal level. For a given system these blocks may be set to a constant less than unity, so it is a filtering function)**;

c) integrating the filtered error function (**i.e. as shown in Fig. 5, component 40 integrates the output of the normalize function 36 and 26, The output of 28 is then digitally integrated by a register 30, The output of 38 is then digitally integrated by a register 40, page 4, paragraph 58**);

d) determining a modified error function by adding the integrated (**i.e. as shown in Fig. 5, the normalized (36 and 26 of Fig. 5) and integrated (40 and 30 of Fig. 5)**) and filtered error function (**i.e. the output of the normalize function 36 and 26 of Fig. 5**) to a product of the integrated and filtered error function and a parameter based on speed and stability (**i.e. as shown in Fig. 5 the normalized (output of 36 and 26) is being multiplied with a parameter μ_Φ at 38 and then being added at step 42 with the integrated step 40 function, page 4, paragraph 58, as described the abstract an initial set of convergence parameters can be applied to speed-up the start of convergence, and a second set of smaller values can be applied some time later for more precise convergence**);

e) determining a gain on the basis of a product of the modified error function and a factor (**i.e. the digitized I component is then amplified, i.e., multiplied by a circuit 14 having a variable coefficient C.sub.0, the coefficient being a function of a gain imbalance loop described below, the output of circuit 14 being a rebalanced I. The digitized I component is also multiplied by a circuit 16 having a variable coefficient C.sub.1, the coefficient being a function of a phase imbalance loop described below, page 4, paragraph 58**);

f) determining a corrected output signal of the I/Q components of the received signal on the basis of subsequent samples of phase compensated in-phase components and quadrature components of the received I/Q modulated signal and the modified error function (**i.e. the output of the 14 and 18 is rebalanced as described in page 4, paragraph 58, again as described above the I and Q are being sampled by A/D 10 and 12 of Fig. 5 and it is subsequent as shown in page 2 and 3, paragraph 39, also the received signal is modulated and the modified error function is the output of 40 as described above in step d**);

g) returning to step a (**i.e. as shown in Fig. 5 the output is being fed back to the normalize function 36 and 26 again so it repeats step a again**); and

providing estimated and compensated I and Q components of the received I/Q modulated signal to a symbol synchronizer for synchronization (**i.e. as shown in Fig. 5 and described in page 4, paragraph 58 it reblances the I and Q component and estimates error. It is inherent to one of the ordinary skilled in the art to perform synchronization of the rebalanced I and Q component, the synchronization can not be performed if I and Q are offset**).

Regarding claim 15, there are substantially same limitations as claim 5, thus the same rejection is applicable.

Regarding claim 16, there are substantially same limitations as claim 4, thus the same rejection is applicable.

Regarding claim 17, there are substantially same limitations as claim 2, thus the same rejection is applicable.

Regarding claim 18, there are substantially same limitations as claim 4, thus the same rejection is applicable.

Regarding claim 19, there are substantially same limitations as claim 2, thus the same rejection is applicable.

Regarding claim 20, there are substantially same limitations as claim 4, thus the same rejection is applicable.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claim 2 rejected under 35 U.S.C. 103(a) as being unpatentable over **Wiss (US 20020097812)** in further view of **Richards et al. US (6,289,048)**.

Regarding claim 2, Wiss teaches normalization function which is considered as filtering of the signal. **(i.e. the output of 34 and 24 is being fed into the normalized function 36 and 26, as described in page 4, paragraph 59 They account for signal level fluctuations into the receiver. These functions have the effect of ensuring constant adaptation behavior regardless of input signal level. For a given system these blocks may be set to a constant less than unity, so it is a filtering function**). However does not specifically disclose that the filter is a low-pass filter.

Richards teaches a low pass filter for low pass filtering the signal (**i.e. 118 – 124 of Fig. 3**).

It would have been an obvious matter of design choice to one skilled in the art at the time the invention was made to use low-pass filter as provided by the inventor since applicant has not disclosed that this solves any stated problem or

is anything more than hardware choice. A person of ordinary skill in the art would find obvious for the purpose of filtering unwanted noise. In re Dailey and Eilers, 149 USPQ 47 (1966) see MPEP 2144.04.

9. Claim 14 rejected under 35 U.S.C. 103(a) as being unpatentable over **Wiss (US 20020097812)** in further view of Cochran (US 6,442,217).

Regarding claim 14, Wiss teaches the receiver according to claim 1, however does not specifically disclose comprising means for symbol synchronization which receives the estimated and compensated I and Q components and performs synchronization of the components.

Cochran teaches means for symbol synchronization which receives the estimated and compensated I and Q components and performs synchronization of the components **(i.e. a communication system (10) includes a transmitter (12) which induces in a communication signal (16), a first component of in-phase to quadrature phase (I-Q) imbalance and a receiver (14) which adds a second component of I-Q imbalance. A digital, intermediate frequency (IF) I-Q balancer (38) compensates for the receiver-induced I-Q imbalance so that total distortion is sufficiently diminished and a data directed carrier tracking loop (60) may then perform carrier synchronization to generate a baseband signal (70), abstract)**.

It would have been obvious to one of the ordinary skilled in the art at the time the invention was made to combine the teachings of Wiss with Cochran.

One would be motivated to combine these teachings because in doing so it will provide synchronized output which is desired in communication system.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TANMAY K. SHAH whose telephone number is (571)270-3624. The examiner can normally be reached on Mon-Thu (7:30 - 5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Payne can be reached on 571-272-3024. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/TANMAY K SHAH/
Examiner, Art Unit 2611

/Mohammad H Ghayour/
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